

ERGONOMICS

AN INTERNATIONAL JOURNAL DEVOTED TO THE
SCIENTIFIC STUDY OF HUMAN PERFORMANCE AND
HUMAN FACTORS IN WORK, MACHINE CONTROL
AND EQUIPMENT DESIGN

The Official Publication of the
ERGONOMICS RESEARCH SOCIETY
INTERNATIONAL ERGONOMICS ASSOCIATION
and
NEDERLANDSE VERENIGING VOOR ERGONOMIE

VOLUME 16



Printed and Published by

TAYLOR & FRANCIS LTD

10-14 MACKLIN STREET, LONDON WC2B5NF

General Editor

P. R. DAVIS

Department of Biological Sciences,
The University of Surrey,
Guildford, Surrey

Psychology Editor

E. EDWARDS

Department of Ergonomics & Cybernetics
University of Technology
Loughborough, Leicestershire

Executive Editor

J. G. Fox

The Department of Engineering Production
The University of Birmingham
Edgbaston, Birmingham

Reviews Editor

D. J. WHITFIELD

Department of Applied Psychology
University of Aston
Birmingham

Editorial Board

- Australia:* Dr. A. T. WELFORD. Department of Psychology, University of Adelaide.
- Belgium:* Dr. H. BASTENIER. Laboratoire d'Hygiène, Université Libre de Bruxelles.
- Canada:* Professor T. M. FRASER. Systems Design Department, Faculty of Engineering, University of Waterloo, Ontario, Canada.
- France:* Professor R. BONNARDEL. École Pratique des Hautes Études, Laboratoire de Psychologie Appliquée, 41 rue Gay-Lussac, Paris 5.
Professor BERNARD METZ. Centre D'Études Bioclimatiques (C.N.R.S.), 21 rue Becquerel, 67087 Strasbourg Cedex.
- Germany:* Professor E. A. MÜLLER. 78 Freiburg-Haslach, Gilgenmatten 13.
- Great Britain:* Dr. J. E. COTES. Pneumoconiosis Research Unit, Llandough Hospital, Penarth, Glam.
Dr. W. E. HICK. University of Cambridge, Psychological Laboratory, Downing Place, Cambridge.
Dr. H. G. MAULE. Department of Mechanical Engineering, University College, Torrington Place, London, W.C.1.
- India:* Professor A. S. PAINTAL. Director, The Patel Chest Institute, Delhi University, Delhi 7.
- Italy:* Professor R. MARGARIA. Laboratorio di Fisiologia, Università di Milano, 20133 Milano, Via Mangiagalli 32.
- Japan:* Professor M. OSHIMA. Institute of Medical Electronics, Faculty of Medicine, University of Tokyo, Hongo, 7-3-1 Bunkyo-ku, Tokyo, Japan.
- Netherlands:* Dr. F. H. BONJER. Netherlands Instituut voor Praeventieve Geneeskunde, Leiden.
Professor J. F. SCHOUTEN, Instituut voor Perceptie Onderzoek, Insulindelaan 2, Eindhoven.
- Sweden:* ULF ABERG. Svenska Arbetsgivareföreningen, S Blasieholmshamn 4A, Box 16 120, 103 23 Stockholm.
- Switzerland:* Professor E. GRANDJEAN. Institut für Hygiene und Arbeitsphysiologie der Eidgenössischen Technischen Hochschule, Zurich.
- U.S.A.:* Professor H. S. BELDING. University of Pittsburgh, Graduate School of Public Health, Pittsburgh 13, Pennsylvania.
Dr. R. W. PEW, Department of Psychology, University of Michigan, Ann Arbor, Michigan.

CONTENTS OF VOLUME 16

NUMBER 1—JANUARY 1973

	Page
Symposium on Heart Rate Variability. By J. M. ROLFE.....	1
Cardiac Arrhythmia as a Field Technique: Some Comments on a Recent Symposium. By E. N. CORLETT	3
Psychological Factors Influencing the Relationship Between Cardiac Arrhythmia and Mental Load. By PATRICIA A. FIRTH	5
Analysis of Heart Rate Variability. By B. MCA. SAYERS	17
Heart Rate Variability and Work-Load Measurement. By W. ROHMERT, W. LAURIG, U. PHILIPP and H. LUCZAK	33
Motor, Thermal and Sensory Factors in Heart Rate Variation: A Methodology for Indirect Estimation of Intermittent Muscular Work and Environmental Heat Loads. By J. J. VOGT, M. TH. MEYER-SCHWERTZ, B. METZ and R. FOEHR	45
Psychophysiological Reactions to Mental Tasks: Effort or Stress? By H. J. G. ZWAGA	61
Mental Load and the Measurement of Heart Rate Variability. By G. MULDER and W. R. E. H. MULDER-HAJONIDES VAN DER MEULEN	69
An Analysis of Heart Rate Variability. By H. LUCZAK and W. LAURIG	85
Do You Believe in Sinus Arrhythmia? By J. W. H. KALSBECK	99
The Information Content of Successive RR-Interval Times in the ECG. Preliminary Results Using Factor Analysis and Frequency Analysis. By C. H. J. M. OPMEER	105
Abstracting Service.....	113
Book Reviews	129
Scientific Meeting	139

NUMBER 2—MARCH 1973

Self-Estimates of Distractibility as Related to Performance Decrement on a Task Requiring Sustained Attention. By R. I. THACKRAY, KAREN N. JONES and R. M. TOUCHSTONE.....	141
A Comparison of Visual, Auditory, and Cutaneous Tracking Displays when Divided Attention is Required to a Cross-Adaptive Loading Task. By T. R. SCHORI	153
An Industrial Study of the Effects of Feedback and Fault Density on Inspection Performance. By C. G. DRURY and J. L. ADDISON	159

	Page
The Effects of Hand-Finger Exercise on Human Handwriting Performance. By H. S. R. KAO.....	171
Searching Through Letter Arrays. By I. E. GORDON and MARGARET WINWOOD.....	177
The Effects of Core Temperature Elevation and Thermal Sensation on Performance. By M. F. ALLNUTT and J. R. ALLAN	189
Transfer and Retention After Habituation to Rotation. By K. A. PENMAN	197
Circadian Rhythms of Food Intake and Oral Temperature in 'Morning' and 'Evening' Groups of Individuals. By O. ÖSTBERG	203
Multidimensional Analysis of Subjective Symptomatology during Prolonged Strenuous Exercise. By R. A. KINSMAN, P. C. WEISER and D. A. STAMPER ..	211
Optimal Duration of Endurance Performance on the Cycle Ergometer in Relation to Maximal Oxygen Intake. By F. I. KATCH	227
Correspondence	
Comment on 'Estimation of the Energy Expenditure of Sporting Cyclists'. By J. D. BROOKE and G. J. DAVIES	237
Book Reviews	239
Abstracting Service.....	251

 NUMBER 3—MAY 1973

Editorial Note	261
Index	263
Plenary Sessions	
Systems Development. By D. MEISTER	267
Design and Evaluation of Consumer Products	281
Ergonomics and Standardization.....	283
Promotion, Application and Evaluation of Ergonomics in Practice. By P. A. VAN WELY	285
Concurrent Sessions	
Transportation Systems.....	289
Industrial Appliances	291
Education and Training	293
Household Appliances	297
Discussion Groups, Short Communications and Workshops	
Systems Development—Psychological and Sociological Implications	301
Ergonomic Implications of Mechanisation in Agriculture.....	303
Public Transport.....	305

	Page
Industrial Physiology (Heat Exposure)	307
Industrial Physiology (Psycho-Physiology).....	311
Undersea Exploration	315
Ergonomics for the Handicapped	317
Industrial Appliances.....	319
Industrial Physiology (Posture and Movement).....	323
Transportation Systems (Signals in Traffic)	327
Ergonomics and Standardization	329
Industrial Psychology.....	331
Ergonomics in Safety Design	335
National Ergonomics Activities	339

NUMBER 4—JULY 1973

Adaptive Measurement of Vigilance Decrement. By E. L. WIENER.....	353
Studies of Visual Inspection. By J. W. SCHOONARD, J. D. GOULD and L. A. MILLER	365
Monitoring up to 16 Synthetic Television Pictures Showing a Great Deal of Movement. By A. H. TICKNER and E. C. POULTON.....	381
Communications Content Training as an Ingredient in Effective Team Performance. By A. I. SIEGEL and P. J. FEDERMAN	403
Use of a Digital Computer for Studying Velocity Judgements of Radar Targets. By B. BERGSTRÖM, P. ARNBERG, M. GILLBERG and H. JANSSON	417
Use of a Response Surface to Optimize Digital Telecommunication Systems. By S. M. SOLIDAY and J. A. GARDNER	423
Phonemic Analysis as a Predictor of Error in Aural Communication. By J. G. FOX, G. J. COLEMAN and GWYNETH LLEWELLYN	435
Keeping Track of Sequential Events: Implications for the Design of Displays. By R. A. MONTY	443
Human Reactions to Whole-Body Transverse Angular Vibrations Compared to Linear Vertical Vibrations. By L. SJØFLOT and C. W. SUGGS.....	455
Optimal Work-Rest Schedules Under Prolonged Vibration. By R. A. DUDEK, M. M. AYOUB and M. A. EL-NAWAWI	469
An Exploratory Study of Arm-Reach Dynamics Under Several Levels of Gravity. By N. M. AUME	481
Tendon Reflex Amplitude at Increasing Task Difficulty. By C. H. M. BRUNIA, H. J. G. ZWAGA and A. VAN BOXTEL	495
Effects of Experience of the Driver on Heart-Rate, Respiration-Rate, and Subsidiary Reaction Time in a Three Hours Continuous Driving Task. By H.-O. LISPER, H. LAURELL and G. STENING	501
The Relationship between the Energy Expenditure and Pulse Rates with Body Weight and the Load Carried During Load Carrying on the Level. By S. R. DATTA, B. B. CHATTERJEE and B. N. ROY	507

	Page
Equipment Note. The Use of Real-Time Simulation by Means of Animation Film as an Analytical Design Tool in Certain Spatial-Temporal Situations. By C. DUNN	515
Abstracting Service	521
Book Reviews	539
Ergonomics Research Society. Annual Conference 1973. Abstracts of Papers	553
Notice	563
Erratum	563

NUMBER 5—SEPTEMBER 1973

Preface	565
Stress and Performance. By A. T. WELFORD.....	567
Human Information Processing under Varying Task Demand. By R. W. CUMMING and P. G. CROFT.....	581
Physiological Response to Relevant and Irrelevant Stimuli in a Simple Reaction Time Situation. By D. CARROLL.....	587
Physical Exertion and Mental Performance. By C. P. DAVEY.....	595
Anatomical and Physiological Mechanisms of Arousal, with Special Reference to the Effects of Exercise. By C. J. COOPER.....	601
Thermal Stress and Thermal Comfort. By R. K. MACPHERSON.....	611
Thermal Stress and Arousal. By K. A. PROVINS, D. J. GLENCROSS and C. J. COOPER.....	623
A Theory of Fatigue. By C. CAMERON.....	633
A Study of Occupational Stress and Health. By D. FERGUSON.....	649
The Measurement of Physiological Predisposition to Tenosynovitis. By R. WELCH.....	665
Working Conditions with Different Types of Disability. By J. C. McEWEN	669
Stress, Adrenocortical Activity and Sleep Habits. By M. D. E. GOODYEAR	679
Stress and Coronary Heart Disease. By M. W. JOHNS.....	683
Psychiatric Aspects of Stress. By I. PILOWSKY.....	691
Abstracting Service.....	699
Book Reviews	717

	Page
Ergonomics Research Society	
The Society's Lecture 1973. Theoretical Approaches to Human Error. By W. T. SINGLETON.....	727
The Effects of Intermittent Noise on Human Serial Decoding Performance and Physiological Response. By D. W. CONRAD.....	739
Dials v. Counters: Effects of Precision on Quantitative Reading. By W. E. NASON and C. A. BENNETT.....	749
Dark Adaptation Recovery After Pulsed Light. By D. J. FLORIP and R. W. BAUER.....	759
Temporal Organization in a Repetitive Speed Skill. By D. J. GLENCROSS	765
Change of Mean Speed in Order to Obtain a Prescribed Increase or Decrease in Travel Time. By O. SVENSON.....	777
Prediction of Adult Aerobic Capacity from Childhood Tests. By O. LOMAEV and J. G. ALLEN.....	783
Influence of After-Movement on Muscle Memory Following Isometric Muscle Contraction. By J. HEIDE and S. MOLBECH.....	787
Performance Evaluation of an Amputee-Prosthesis System in Below-Knee Amputees. By S. GANGULI, S. R. DATTA, B. B. CHATTERJEE and B. N. ROY	797
The Effects of Stages of Chapati Making and Angles of Body Position on Heart Rate. By JAGJIT KAUR DHESI and FRANCILLE M. FIREBAUGH.....	811
Physical Workload in Different Body Postures, While Working Near to, or Below Ground Level. By H. W. VOS.....	817
A Lightspot Operated Typewriter for Severely Physically Handicapped Patients. By M. SOEDE, H. G. STASSEN, A. VAN LUNTEREN and W. J. LUITSE	829
A Combined Accelerator-Brake Pedal. By G. K. POOCK, A. E. WEST, T. J. TOBEN and J. P. T. SULLIVAN.....	845
A Model of Vehicle Comfort and a Method for its Assessment. By I. MANENICA and E. N. CORLETT.....	849
The Development of Questionnaire Surveys for the Investigation of Passenger Comfort. By D. J. OBORNE and M. J. CLARKE.....	855
Abstracting Service	871
Book Reviews	889
National Ergonomics Activities	901
Notices	903
Index of Authors (with the Titles of the Papers).....	907

